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The Effectiveness of Blended Learning in the Field of Medical Education: Explaining Dimensions and Components Based on Stakeholder Experiences

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Abstract

Background & Objective: Blended learning is the thoughtful integration of e-learning and face-to-face learning, which has been accepted in the field of medical education. Given the importance and complexity of this novel educational system, this study aimed to recognize and gain an in-depth understanding of the factors and dimensions affecting the effectiveness of blended learning based on the experiences of stakeholders in this area.

Materials and Methods: In this qualitative research, content analysis approach was applied. Subjects included seven faculty members of Iran University of Medical Sciences with a history of teaching through virtual education systems for a minimum of two years and eight MSc students in medical disciplines, selected by convenience sampling. Data analysis was performed applying the seven-step Colaizzi method.

Results: In this study, five categories, including student capabilities, teacher competencies, technical aspects, pedagogical field, and supportive environment, and 40 subcategories were obtained.

Conclusion: The importance of teaching-learning and increasing demand for access to education from one hand and emphasis on the effectiveness of education from the other hand are among the major challenges of all educational systems. According to the results of the study, the desirable position of this type of training could be found by the fundamental review of acceptance of students and professors and providing the necessary technical facilities.

Introduction

Considered a relatively new term, the concept of blended learning has existed in areas including virtual education for several decades (1). Generally, the term blended learning' refers to the third generation of distance-education systems, described as a technique used to maximize the educational benefits of in-person learning and multiple technologies for learning (2). This type of education is the thoughtful integration of classroom face-to-face learning experiences with online learning experiences (3). This method is exploited to optimize learning outcomes and cost effectiveness (4). Providing only virtual training to a group of audiences with diverse specialized and intellectual backgrounds may not be sufficiently effective for all people. As such, blended learning aims at providing opportunities for students to use both actual and virtual spaces to make better use of learning (5).

The field of medical education, which is a part of higher education responsible for providing a large volume of knowledge, attitude, and skills to students for the acquisition of professional qualifications (6), is no exception and requires the use of novel techniques (7). Evaluation of research institutes and universities such as Stanford and Tennessee regarding the mechanism of blended learning in the medical field provides interesting information to enthusiasts. Research suggests that blended learning is preferable to traditional practices, ensuring that not only this type of education can transfer learning materials more efficiently, but also is a more effective educational approach (8). Given the ability to provide the benefits of both traditional and virtual methods,

blended learning is a proper technique to achieve the teaching-learning goals in medical education.

The interdependence of teaching and learning is confirmed since while teaching is the teacher's activity, the result of learning depends on the student. Therefore, effectiveness must be assessed from both the viewpoints of students and instructors to demonstrate more complete results. Despite the assessment of the status of blended training and comparison of existing problems by several researchers, no research has been conducted on the aspects and efficacy of blended training. With regard to the importance and complexity of this modern learning system, this study aimed to recognize and have a deeper understanding of factors and dimensions affecting the efficacy of blended learning based on the experiences of students and instructors in this field.

Materials and Methods

Content analysis was used in this study. Qualitative content analysis is an approach for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns (9). In this approach, categories are derived directly from the text data, and the researcher obtains an in-depth understanding of a phenomenon (10). In the present study, qualitative content analysis was primarily exploited to discover meanings, priorities, attitudes, and perceptions of students and faculty members of effective blended learning by analyzing their linguistic messages. Participants included seven faculty members of Iran University of Medical Universities with a history of applying the virtual education system for a minimum of two years and eight MSc students in fields of medical sciences selected by purposeful and convenience sampling.

Inclusion criteria were having an experience of teaching or learning by virtual education, availability, willingness to participate in the study, eloquence based on the initial meeting, and the ability to respond. Data collection tools included semi-structured interviews with subjects (duration=30-45 min), which were carried out individually.

All interviews were recorded and transcribed word-for-word to be analyzed. The primary questions were, as follows:

What is your opinion about blended learning and its implementation method?

In your opinion, what are the challenges of blended learning?

What is the feasible technique to improve and enhance this type of learning according to the existing context?

During interviews, exploratory questions were also raised based on the responses of participants. Data analysis was carried out using the seven-step Colaizzi method. This technique includes familiarizing with the data through reading the important findings, identifying the significant statements with direct relevance to the phenomenon under study, formulating meanings to extracted statements, clustering themes and concepts obtained, referring to the original contents and comparing the data, describing the phenomenon under study and seeking verification of the fundamental structure to assess the reliability of the results. This process is accompanied by the coding and extraction of the main categories and subcategories (11).

In this research, credibility, dependability, and confirmability were assessed to ensure the rigor of findings (12). Credibility was obtained through various methods, including ability, sufficient experience and scientific capability of the researcher based on level of education, from the aspect of engagement prolong as a collaborative engagement with data to increase the breadth and depth of information, persistent observation by reading the data several times and analysis of the data and use of integration in data collection through group discussion method and face-to-face unstructured observation, and member checks to validate the extracted content. In another session, the information extracted was checked with students and faculty members to receive their final opinions and suggestions.

Data acceptance was obtained through sufficient experience of the researcher and constant involvement and continuous observation, and the writings of the participants were confirmed

Finally, there was evidence for disconfirming searching, which led to the use of disconfirming results of other studies to increase credibility (12). Moreover, the reports and research notes were

provided to another leading scholar in virtual education to ensure the similarity of the results by two researchers, thereby confirming the objectivity of the data. To obtain dependability of the results (similar to reliability in quantitative research), another researcher who was not related to the research was employed as an external observer. In the end, dependability was approved based on a similar perception of the findings.

Data analysis was performed in MAXQDA-10 software. In order to observe ethical considerations, the research objectives and method of implementation were explained to all participants and a written informed consent was obtained prior to the research. In addition, the subjects were allowed to withdraw from the research, and they were ensured of the confidentiality terms regarding their personal information (anonymous audio files). The questionnaires and the consent form were sent by email.

Results

The results of the qualitative research are presented in the table below in five categories and 40 sub-categories:

Table 1: Demographic characteristics of participants

Variable	Faculty Members	Students
	Male:2	Male:3
	Female:5	Female:5
Mean Age	52.3	26.8

- Student Capabilities

According to the interviewees, one of the effective factors for efficient blended learning is the presence of capable students who have the optimal problem-solving power and have learned cognitive and metacognitive skills (e.g., creativity, critical thinking, and self-direction). Participant No. 10 claimed: “blended learning requires individual maturation, as well as creativity, critical thinking, and self-teaching.” In addition, one of the faculty members asserted: “both students and teachers must have the minimum information and computer literacy. Moreover, their personality structure plays an important role in the formation of proper interaction and effective education.” (Participant No. 7)

- Teacher Competencies

Another category obtained was teacher competencies. In this regard, participant No. 12 expressed: "our professors neither have the proper literacy of such fields nor have the ethics for this environment. So, how can we claim that they have provided effective education?”

- Technical Aspects

Another category derived was technical aspects, where statements expressed were related to the cyberspace and electronic content. Participant No. 12 mentioned: "education will not be effective if there is no easy access to high-quality and updated educational content. In fact, blended learning must be consistent with technological advancements, and the learning system must have a friendly environment.”

- Pedagogical Field

Another category obtained was the pedagogical field, which contained subcategories including teamwork, collaborative learning, monitoring student progression, and virtual feedback. In this respect, participant No. 14 stated: “pedagogical issues are important in every teaching-learning process. However, this importance is doubled in blended learning.”

-Supportive Environment

According to interviewees, the supportive environment can be effective in developing blended learning, in a way that the widespread communication and electronic mentorship create a suitable environment where both the learner and the teacher are eager to learn and teach. Accordingly, participant No. 13 marked: “students have the right to study in a relaxed environment without any tension, discrimination, or chaos and with maximum communication with the teachers.”

Table 2: The categories and subcategories of factors affecting effective blended learning according to faculty members and students of medical sciences

CATEGORY	SUB CATEGORY
Student Capabilities	Metacognitive Skills
	Information literacy
	Personality Dimensions
	Netiquette
Teacher Merits	Content Expertise
	Professional Commitment
	Information literacy
	Netiquette
	Verbal & Non-Verbal Communication Skills
	Emotional Intelligence
	Virtual Class Management
	Cyber Skills
	Cybergogy
	Accessibility
	Role Modelling
Technological Aspects	High-Quality Content
	Up-To-Date Content
	Reviewability & Revisability Content
	User-Friendly Sketching System
	Cyber Rules
	Interactive Virtual Environment
	Free Access to Content
	Virtual Computing Infrastructure
	Content Size
Pedagogic Topics	Team Working
	Collaborative E- Learning
	Effective Evaluation
	Designing E-Learning Activities
	Active E- Learning
	Student Progress Monitoring
	Content Flexibility
	Content Qualities
	Content Attractiveness
	Virtual Feedback System
	Organized Content
Supportive Environment	E- Mentoring
	Active Management
	Deeper Connection
	Safe Environment
	Strong Guidance

Discussion

Blended learning has several components. In a study entitled " Framework for E-learning Effectiveness in The Arab World", the results showed that a group focused only on the other technological aspects, a group focused on the pedagogical aspects, and another group focused on both aspects (13). Nevertheless, conflicting results were obtained in the present study and research groups considered five factors of student capabilities, teacher competencies, technical aspects, pedagogical field, and supportive environment as effective factors in this regard. In the category of student capabilities, two subcategories of metacognitive skills and information literacy were the most important factors.

In other studies, it was demonstrated that learners were self-directed in this type of learning, and the education method had significantly high effectiveness due to the possibility of repeating the educational program (14, 15). In addition, results of other studies

indicated that students had more control over the speed and current of their learning in this type of education and were able to achieve their goals in a shorter time by selecting accurate resources and metacognitive processes, such as time management (16). Some studies have suggested the importance of satisfactory order and attention to values in measuring the effectiveness of the teaching method (17). In other words, student satisfaction with increasing motivation and commitment to the E-learning program brings academic achievement and reduces withdrawal from education (18).

However, this result was not obtained in the present research. It has been stated in some articles that counseling and teaching study skills to students can affect the effectiveness of this educational system, which is also inconsistent with our findings (19). According to the researcher, since these skills are effective and trainable, teachers can achieve effective training by teaching these skills. Teachers play a prominent role in effective and efficient learning (20). Studies in this field also confirm the findings of the current study (21-23). Nonetheless, many studies claim that the mere use of technology is not effective in increasing student satisfaction, and in fact, it is the instructor who is effective in this regard (24). However, the teacher himself must have specific capabilities in order to affect the teaching-learning process in the field of E-learning. Accordingly, some of the most frequent subcategories of this area included information literacy, content expertise, and virtual classroom management. Adams believes that these competencies can significantly improve learning. In a study conducted in Korea, the teacher's experience and expertise and his knowledge of the cyberspace were recognized as the aspects of the quality of virtual education in human dimensions (25). Inconsistent with our findings, some studies demonstrated that the attitude of teachers was one of the factors for the success of the course due to the close association between the instructors' beliefs and teaching behavior and learning goals (24, 26). Regarding the technical aspects, studies showed that there is a significantly wide range of factors related to blended learning, and attention to its aspects requires high-quality contents and precise and specific cyber laws. Based on the viewpoints of faculty members and students, the subcategories of the virtual interactive environment and virtual infrastructures had the highest frequency.

Other studies confirmed that designing flexible education and producing standardized electronic content had a direct impact on the effectiveness and efficiency of E-learning (27). However, qualitative problems related to the provision of educational materials, as well as updating and modifying courses are among the limitations of virtual education (28). The necessity of an e-learning environment is the existence of a bilateral and attractive interactive environment (29). Evidently, having the primary infrastructure and constantly equipping it along with the advancement of technology is one of the main factors affecting the quality (30), which is in congruence with the results of other studies.

It should be acknowledged that the foundation of any form of education is recognizing the pedagogical aspects. In the pedagogical field, the principles of designing appropriate educational content, effective evaluation, and learning strategies must be taken into account, which is in accordance with our findings (31). From the viewpoint of those involved in the education field, teaching pedagogical issues and evaluating processes complement each other (32). Nonetheless, the evaluation was considered less significant by the subjects of the present research, compared to other categories. This issue might be related to the type of learners, who were all adults, had self-directed learning, and did not consider evaluation important.

On the other hand, feedback and monitoring system play a significant role in student progress in virtual education. Other scholars introduced feedback as one of the essential components of blended learning skills (33). Furthermore, Graham stated that the principle of using blended learning is to improve areas such as pedagogy and interaction (34). Providing proper and immediate feedback leads to cooperation and interaction between teachers and students (35). However, little research has been conducted on monitoring progress in the virtual area. Another element of effective training was the supportive environment, where the two subcategories of strong guidance and electronic mentorship had the most importance in the present research. Bouras believes that learning goals will not be achieved if there is no proper guidance in virtual educational environment (36). The information age has created dynamic changes in relationships. Therefore, education in this field requires electronic

mentorship. In this regard, our findings are in line with the results of other scholars (37).

Some of the strengths of this study were separating the viewpoints of students from professors and describing the dimensions and components affecting blended learning, illustrating the status quo. On the other hand, the limited number of students and lack of ability to evaluate and compare the basic and clinical professors of universities of medical sciences (due to an inadequate number of participants) were among the weaknesses of the present study. Another major drawback of the research was lack of assessing and distinguishing of medical and paramedical students, which was mainly due to the lack of a permanent place of students. It is suggested that independent research be conducted to evaluate blended learning in the field of medical and non-medical education and compare the view of the two areas.

Conclusion

The effectiveness of any form of training, including virtual training, especially in the medical field, is one of the challenges faced by all educational organizations in the field of medicine. While the advent of technology has promised the provision of these opportunities, it will not create effective training independently. According to the results of the present research, the competent position of blended learning can be found by a fundamental review of acceptance of students and professors and providing the necessary technical facilities for this educational field. On the other hand, effective orientation can be created in the field of virtual education by holding teacher empowerment courses.

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